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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/092,617	03/08/2002	Takaharu Kondo	03500.016270.	8664

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16
-EXAMINER-

STEIN, STEPHEN J

ART UNIT	PAPER NUMBER
1775	

DATE MAILED: 07/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/092,617

Applicant(s)

KONDO ET AL.

Examiner

Stephen J Stein

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-90 is/are pending in the application.
- 4a) Of the above claim(s) 25-45 and 70-90 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-23 and 51 is/are allowed.
- 6) ☒ Claim(s) 24,46,47 and 57-69 is/are rejected.
- 7) ☒ Claim(s) 48-56 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 1-25 and 46-69 in Paper No. 9 is acknowledged. The traversal is on the grounds that there is no undue burden in examining both the group I and group II claims. Applicants further argue that the groups of claims are not so unrelated as would require a burden beyond that of the normal burdens of examination. This argument has been considered, but not found persuasive. MPEP § 808.02 recites that for the purposes of the initial requirement of a restriction, a serious burden on the examiner may be prima facie shown if the examiner shows by appropriate explanation either separate classification, separate status in the art, or a different field of search as defined in MPEP § 808.02. Since the Examiner has shown a different classification for the two groups of claims, a burden for examining both groups has been shown.

The requirement is still deemed proper and is therefore made FINAL.

Specification

2. The abstract of the disclosure is objected to because the abstract contains more than 150 words. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

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international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 24 is rejected under 35 U.S.C. 102(b) as being anticipated by JP411233803A (Nishio et al.).

Nishio teaches a photovoltaic device comprising a pin junction wherein a p-type semiconductor layer, i-type semiconductor layer, and n-type semiconductor layer are laminated together, and the i-type semiconductor layer is made of non-single crystal microsilicon (Abstract and paragraph [0006]). With regard to the process limitations recited in claim 24, process limitations in product claims are generally not dispositive on patentability unless it is shown that the process limitations produce a materially different product. MPEP §2113.

5. Claims 24, 46, 47, 57, 60-69 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6,166,319 (Matsuyama).

Matsuyama discloses a photovoltaic element having a plurality of pin junctions, wherein each pin junction comprises a p-type semiconductor layer, an i-type semiconductor layer, and an n-type semiconductor layer (abstract). Matsuyama further teaches that the second pin junction comprises microcrystal silicon as principal component of the i-type semiconductor layer (abstract). Matsuyama still further teaches that the thickness of the p-type layers and the n-type layers is preferably 1-50 nm and more preferably 3-10 nm (col. 17, lines 60-67). The reference still further teaches that dopants may be added to the i-type microcrystal silicon and that as the microcrystal materials for the doped layers, there may be included, for example, materials resulting from addition of a high concentration of the p-type valence electron controller or the n-type valence electron controller $\mu\text{c-Si:H}$, $\mu\text{c-Si:HX}$, $\mu\text{c-SiC:H}$, $\mu\text{c-SiC:HX}$, $\mu\text{c-SiO:H}$, $\mu\text{c-}$

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SiO:Hx, $\mu\text{c-SiN:H}$, $\mu\text{c-SiN:Hx}$, $\mu\text{c-SiGeC:H}$, $\mu\text{c-SiGeC:Hx}$, $\mu\text{c-SiON:H}$, $\mu\text{c-SiON:Hx}$, $\mu\text{c-SiOCN:H}$, and $\mu\text{c-SiOCN:Hx}$ (carbon, nitrogen, oxygen and halogen atom containing materials). Matsuyama further teaches that the microcrystal silicon may include $\mu\text{c-Si:H}$, $\mu\text{c-Si:F}$ and $\mu\text{c-Si:H:F}$. Since the Matsuyama reference discloses no orientation property for the microcrystal silicon i-type semiconductor layer, it is presumed that the microcrystal silicon layer has no specific orientation property.

With regard to the process limitations recited in the claims, process limitations in product claims are generally not dispositive on patentability unless it is shown that the process limitations produce a materially different product. MPEP §2113.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 58, 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuyama.

As stated above, Matsuyama teaches a photovoltaic element having a plurality of pin junctions, wherein the second pin junction comprises microcrystal silicon as principal component of the i-type semiconductor layer, and wherein the microcrystal silicon may include carbon, nitrogen, oxygen and fluorine atoms.

Although, Matsuyama fails to disclose the claimed amount of atoms per cubic cm, absent as showing of criticality with respect to the concentration (a result effective variable) of these

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atoms, it would have been obvious to a person of ordinary skill in the art at the time of the invention to optimize the amounts through routine experimentation. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Allowable Subject Matter

8. Claims 1-23 and 51 are allowed over the prior art.
9. Claims 48-56 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
10. The following is an examiner's statement of reasons for allowance:
11. With regard to claims 1-23 and 51, none of the prior art teaches the claimed microcrystal silicon based film wherein an orientation property of the microcrystal in the silicon-based film containing the microcrystal changes in a film thickness direction. The closest prior art JP411233803A (Nishio et al.), discloses a photovoltaic element wherein the orientation property of a crystal in the i-type semiconductor layer changes in a depth direction. This reference and the prior art of record fail to teach an orientation property of the microcrystal silicon changing in a film thickness direction. With regard to claims 48-56, while Matsuyama teaches a photovoltaic element having microcrystal silicon with no orientation property disclosed, the prior art fails to teach the additional limitations of the intermediate amorphous silicon layer between the i-type microcrystal silicon layer and the first or second conductivity type layer. The prior art further fails to teach or suggest any diffraction intensity of the (220)

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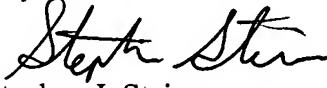
face of the microcrystal. The prior art finally fails to teach or suggest the shape of the microcrystal located in the interface region.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Stein whose telephone number is (703) 305-0583. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:00 p.m. If the attempts to reach the examiner are unsuccessful, the examiner's supervisor, Deborah Jones can be reached by dialing (703) 308-3822. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group Receptionist whose phone number is (703) 308-0661. The fax phone number for this group is (703) 872-9310 for non-final responses and (703) 872-9311 for after final responses.

July 7, 2003


Stephen J. Stein